Spatial quantification of blue carbon at landscape and continental scales: Work at the Coastal Ecology and Management Lab

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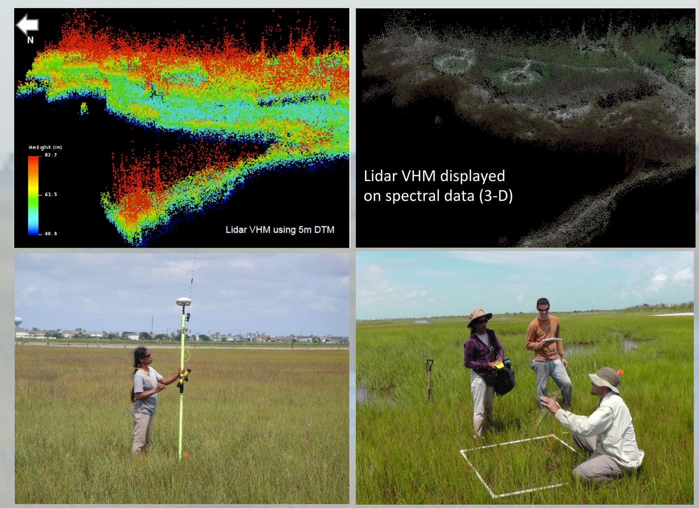
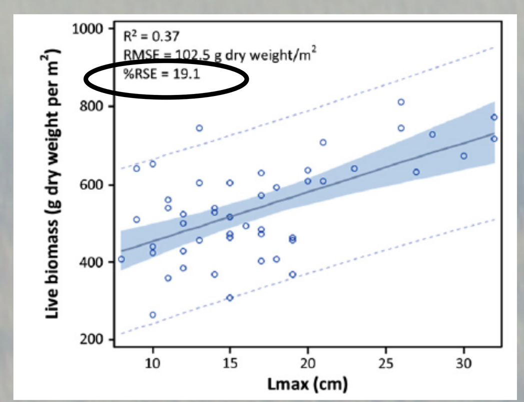
aboveground carbon, landscape scale

We combined LIDAR and multi-spectral imagery to predict field aboveground biomass in herbaceous marshes





Our best LIDAR model predicted ~19% off field-measured live biomass at 1 m^2 resolution

And our best LIDAR+MS models were ~ 16% off

Results of multiple regression models for predicting vegetation biomass. All relationships were highly significant ($p < 0.0001$).

	R2	RMSE (g dry weight/m^2)	%RSE	Best fit model
Live	0.47	86.1	16.0	Live BM = 10.13 * Lmax + 638.09 * SAVI + 179.64
Dead	0.19	200.89	58.3	Dead BM = 4.43 * LCD + 1197.4 * VIGreen + 365.05
Total	0.33	229.20	25.9	Total BM = 15.51 * Lmax + 5.35 * LCD + 1331.7 * VIGreen + 639.13

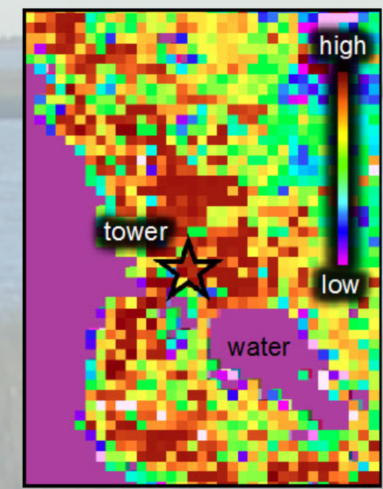
Kulawardhana, R.W., Popescu, S.C., Feagin, R.A. 2014. Fusion of lidar and multispectral data to quantify salt marsh carbon stocks. *Remote Sensing of the Environment* 154: 345-357.

THANKS GO TO SCHLUMBERGER FACULTY FOR THE FUTURE!

aboveground carbon, continental scale

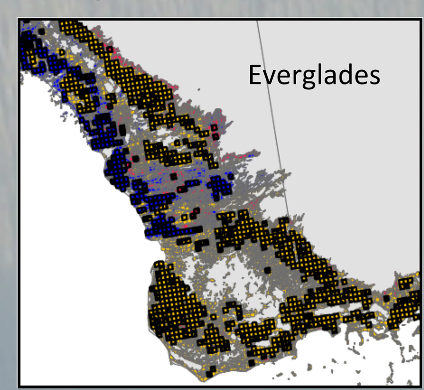
We aim to quantify NPP in tidal wetlands by estuarine basin, wetland type, and state

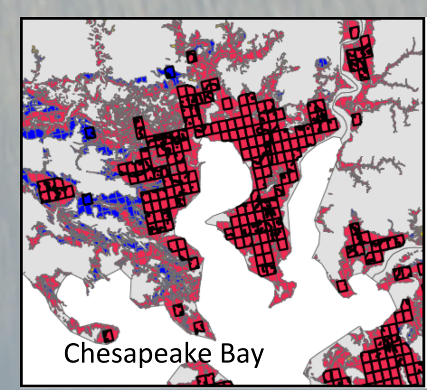
MODIS GPP/NPP algorithms will be implemented using new biophysical parameters and flux tower data specific to herbaceous marshes, shrub-scrub and forested wetlands.

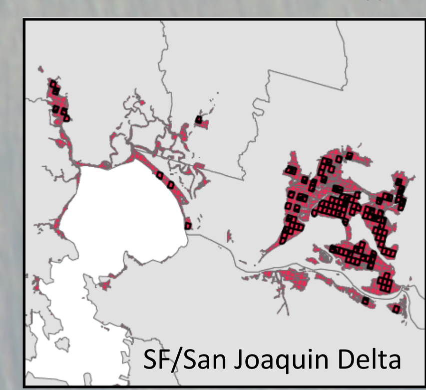


July 2013 MODIS fPAR image surrounding Shark River, FL flux tower

Thus far, we have identified all MODIS pixels that contain NWI tidal wetlands, and the percent in each pixel. Pink = emergent marsh, blue = forested, yellow = shrub-scrub. Pixels outlined in black have > 85% of that wetland cover type.







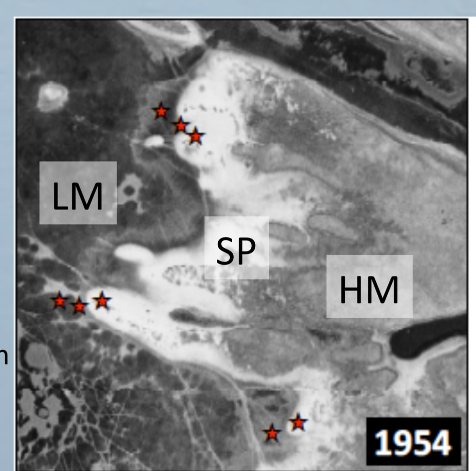
NASA grant to Najjar et al. (Feagin co-PI), 2014-2017. The Carbon Budget of Tidal Wetlands and Estuaries of the Contiguous United States: A Synthesis Approach. Wetland-Estuary Transports and CARbon Budgets –WETCARB.

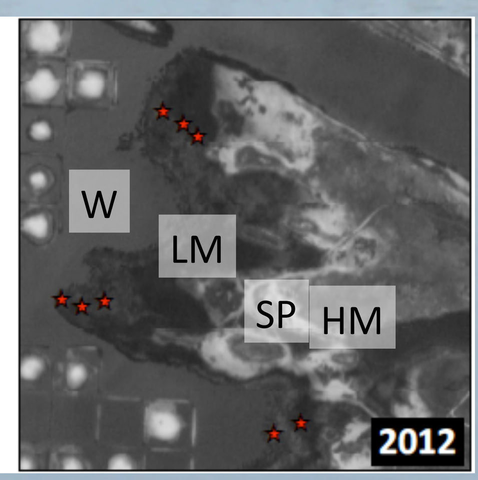
THANKS GO TO NASA!

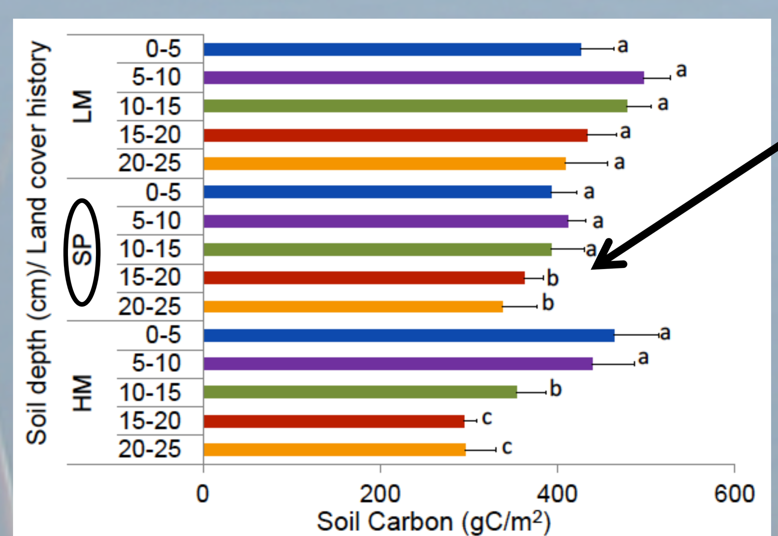
belowground carbon, landscape scale

We took cores from *S. alterniflora* Low Marshes (LM) in 2012, though the wetland cover was different in 1952. Red stars = core locations (subset shown).

W = Water
LM = Low Marsh
SP = Salt Panne
HM = High Marsh







For example, core locations that were Salt Panne (SP) in 1952 had a significant transition in SOC at the 15 cm depth, as they converted into Low Marsh (LM).

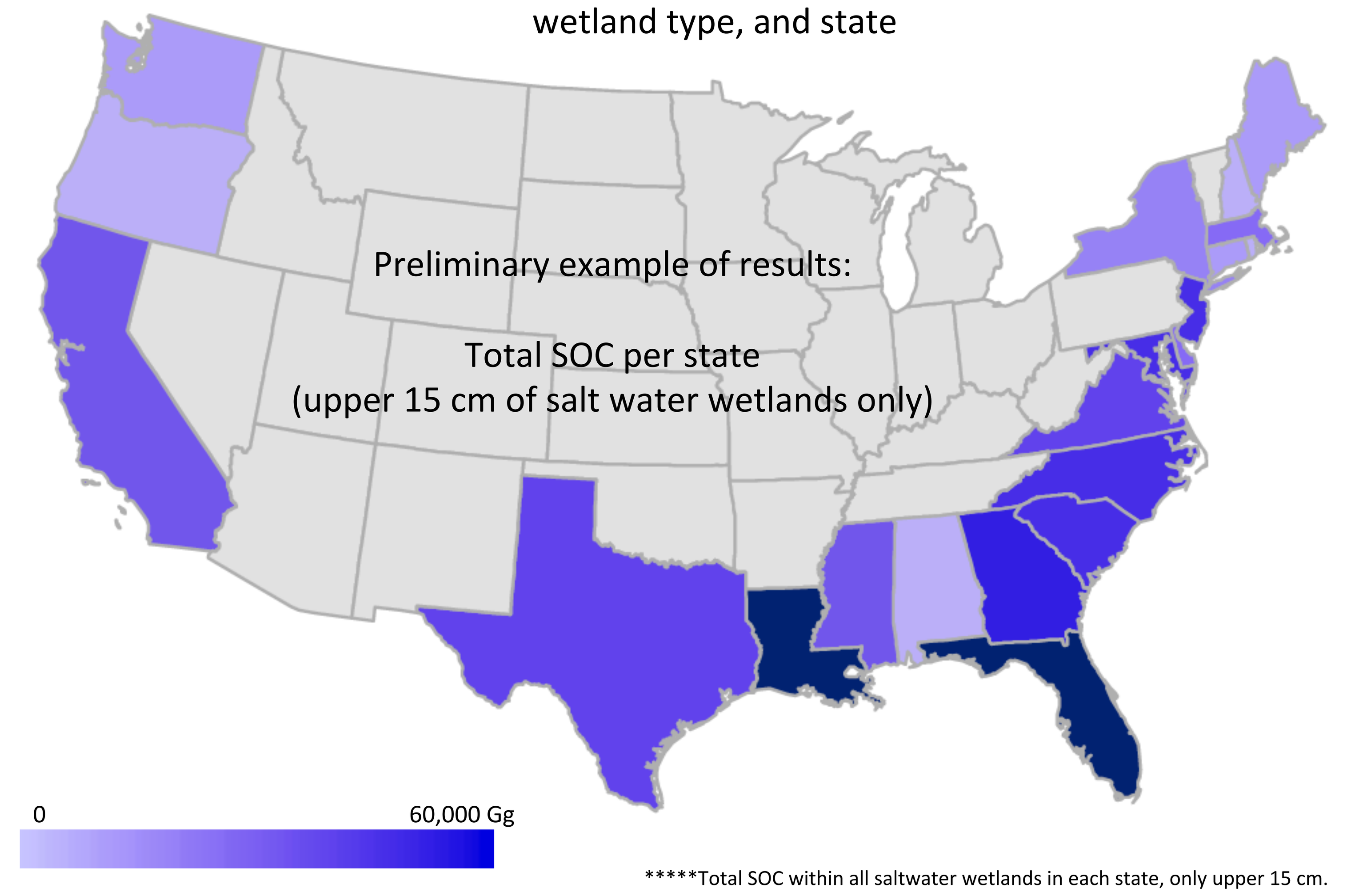
The SOC at depth reflected the wetland cover change as a result of relative sea level rise from 1952 to 2012 (letters denote significant differences).

Kulawardhana, R.W., Feagin, R.A., Popescu, S.C., Yeager, K.M., & Bianchi, T.S. 2015. The role of elevation, relative sea level history, and vegetation transition in determining carbon distribution in *Spartina alterniflora* dominated salt marshes. *Estuarine, Coastal and Shelf Science*. In Press.

THANKS GO TO SCHLUMBERGER FACULTY FOR THE FUTURE!

belowground carbon, continental scale

We aim to quantify SOC in tidal wetlands by estuarine basin, wetland type, and state



NASA grant to Najjar et al. (see above) and also NASA-CMS and USGS grant to Windham-Myers et al. (Feagin co-PI), 2014-2017. Linked satellite and soil data to validate coastal wetland "blue carbon" inventories: Upscaled support for developing MRV REDD+ protocols.

THANKS GO TO NASA AND USGS!